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Pesticide Fact Sheet Number 193
Resmethrin

(U.S.) Environmental Protection Agency
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16. Abstract (Limit: 200 words)

This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

17. Document Analysis a. Descriptors

Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, science findings.

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

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Office of Pesticides and Toxic Substances
Office of Pesticide Programs (TS-766C)
Washington, DC 20460

540/FS-89-033

EPA

Pesticide Fact Sheet

Name of Chemical: RESMETHRIN
Reason for Issuance: Registration Standard
Date Issued: December 1988
Fact Sheet Number: 193

1. DESCRIPTION OF CHEMICAL

Generic Name: [5-(phenylmethyl)-3-furanyl] methyl 2,2-dimethyl-3-(2-methyl-1-propenyl) cyclopropanecarboxylate

Common Name: Resmethrin

Trade and Other Names: Synthrin, SPB-1382, Pynosect, Chrysron

EPA Shaughnessy Codes: 097801

Chemical Abstracts Service (CAS) Number: 10453-86-8

Year of Initial Registration: 1967

Pesticide Type: Insecticide

Chemical Family: Pyrethroid

U.S. and Foreign Producers: Fairfield American (US)
Mitchell Cotts Chemical Ltd. (UK)
Penick - Bio UCLAF Corp. (US)
Sumitomo Chemical Co. (Japan)

2. USE PATTERNS AND FORMULATIONS

Application: Flying and crawling insect control for household, greenhouse, indoor landscaping, mushroom houses, industrial, stored product insects, and mosquito control. Resmethrin is also used for fabric protection, pet sprays, pet shampoos, and application to horses and in horse stables. Resmethrin may be used in USDA meat and poultry programs.

Types of Formulations: Resmethrin is primarily formulated into pressurized liquids and ready-to-use solutions. It is also formulated as an emulsifiable concentrate, soluble concentrate, and on impregnated materials.

3. SCIENCE FINDINGS

Summary Science Statement

Chemical Characteristics of the Technical Material

Physical State: Waxy solid

Color: Off-white to tan

Odor: Chrysanthemate

Molecular Weight and Formula: 338.4

Boiling Point: 180°C at 0.1 mm Hg

Vapor Pressure: 2.58 mm Hg, 200°C

Density: 8.70 lb/gal

Solubility in various solvents: Insoluble in water, 10% in kerosene, and very soluble in xylene, methylene chloride, isopropyl alcohol and aromatic hydrocarbons.

Toxicology Characteristics

Acute Oral: LD_{50} - 750 to 4500 mg/kg

Acute Dermal: LD_{50} - 2500 mg/kg

Primary Dermal Irritation: Not considered to be a dermal irritant.

Primary Eye Irritation: Not considered to be an eye irritant.

Dermal Sensitization: Not considered t0H 1. DESCRIPTION OF CHEMICAL

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Primary Eye Irritation: Not considered to be an eye irritant.

Dermal Sensitization: Not considered to be a skin sensitizer.

Acute Inhalation: LC_{50} >9.49 mg/L (4 hr. exposure)

Major routes of exposure: dermal, eye, inhalation

Delayed neurotoxicity: Studies not required because resmethrin is not an organophosphate.

Subchronic toxicity: A 90-Day subchronic inhalation study in rats did not demonstrate a definite NOEL. At the lowest dose tested, 0.1 mg/L, there was evidence of behavioral reactions to treatment, decreased blood levels of glucose in males, decreased body weights and increased serum urea levels in females. 90-Day subchronic dermal studies are required because currently registered use patterns (i.e. veterinary use only animal shampoos) could result in prolonged or repeated exposure to humans.

Chronic Feeding: A rodent (rat) study did not establish a NOEL. There was some evidence liver enlargement at the lowest dose tested (500 ppm or 25mg/kg/day). At the LEL of 2500 ppm or 125 mg/kg/day, increased liver weigth and pathological lesions in this organ were observed. At the HDT of 5000 ppm, or 250 mg/kg/day, additional dose related increases in liver weight, liver pathology, and also increases in thyroid weight and incidences of thyroid cysts were observed.

A dog chronic chronic study demonstrated a NOEL of 10 mg/kg/day.

Oncogenicity: Resmethrin was determined not to be oncogenic for rats at dosage levels up to and including 5000 ppm, and for mice at dosage levels up to and including 1000 ppm.

Teratogenicity: The teratogenic NOEL for rats was 40 mg/kg/day based on slight increase in aberrations in skeletal findings. There was an indefinite maternal NOEL with some decrease in food consumptions at all dose levels tested and a body weight decrease at the 80 mg/kg/day level. The teratogenic, maternal and fetotoxic NOELs in the rabbit were greater than 100 mg/kg/day (HDT).

Reproduction: A definite NOEL was not established since there were marginally statistically significant increases in the number of pups born dead and decreases in pup weight at weaning at the lowest dosage tested (500 ppm or 25 mg/kg/day). The observed effects were judged to be minimal when the low dose groups were compared with the controls.

Environmental Characteristics

The potential for resmethrin to contaminate groundwater is unknown. However based on the non-leaching characteristics of related pyrethriod compounds and the fact that more than one-half of the 30,000 lbs. used annually is used indoors, it is not likely that use of this chemical will pose appreciable risks to groundwater.

Ecological Characteristics

Avian acute toxicity: Resmethrin is slightly toxic to birds, the LD_{50} > 2000 mg/kg - California quail.

Freshwater fish acute toxicity: Resmethrin is very highly toxic to fish (Bluegill LC_{50} - 0.75 - 2.6 ug/L and Rainbow trout LC_{50} - 0.28 - 2.4 ug/L).

Freshwater and marine invertebrate toxicity:

The Agency does not have any data on invertebrates species, but based on the characteristics of related pyrethroid compounds, resmethrin is believed to be very highly toxic to invertebrates.

Beneficial insects: Resmethrin is highly toxic to honey bees on contact (LD_{50} - 0.063 ug/bee).

TOLERANCE ASSESSMENT

No tolerances have been established for residues of resmethrin in or on any plant or animal commodities. A food additive tolerance of 3 ppm (40 CFR 185.5300) has been established for residues of resmethrin in food items resulting from treatment of food handling establishments and storage areas.

No Codex MRLS have been established for residues of resmethrin in or on food or feed.

4. Required Unique Labeling

All products with mosquito abatement and pest control at aquatic sites are classified Restricted Use and must contain the following restricted use classification statement.

RESTRICTED USE CLASSIFICATION
Due to acute fish toxicity

For retail sale to and use only by certified applicators or persons under their direct supervision and only for those uses covered by the Certified Applicator's Certification.

5. Summary of Regulatory Positions

- The Agency is not placing resmethrin into Special Review. However because of its high acute toxicity to fish, the Agency has serious concerns about resmethrin's toxicity to aquatic invertebrate organisms, particularly in view of the fact that structurally similar pyrethroid compounds are highly toxic to these organisms. The Agency will make a regulatory decision on this issue after completing the review of outstanding aquatic data. The Agency will impose the restricted use classification for certain use patterns.

- The Agency is imposing the restricted use classification for all products containing resmethrin which bear use directions for mosquito abatement and insect control uses at aquatic sites.

- Based on the available toxicity data, the Agency is not requiring the use of personal protective clothing or reentry intervals.

- Because of its structural similarity to other pyrethroid compounds which are not known to leach, resmethrin is not expected to contaminate groundwater.

- The available residue chemistry data are insufficient to permit the Agency to conduct a tolerance reassessment.

6. Summary of Major Data Gaps

Toxicology

Acute Oral
Acute Dermal
Subchronic dermal (21-Day and 90-Day)
Mutagenicity and Genetic Toxicity (full battery of studies including gene mutation, chromosome aberration, and other mechanisms of mutagenicity).
General metabolism and pharmacokinetics

Residue Chemistry

Nature of the residue (metabolism)
- Plants
- Livestock
Residue analytical methods
Storage stability
Magnitude of residue — Meat/milk/poultry/eggs
Food handling establishments

Environmental Fate

Hydrolysis
Photodegradation
- water
Metabolism studies (Lab)
- aerobic soil
- anaerobic aquatic
- aerobic aquatic

Mobility
- Leaching and adsorption/desorption
- Volatility (Lab)

Dissipation (Field)
- soil
- aquatic (sediment)

Ecological Effects

Avian and Mammalian Testing
- Avian Dietary LC_{50}
- Avian Reproduction

Aquatic Testing
- Fish early life stage
- Freshwater fish LC_{50}
- Acute LC_{50} freshwater invertebrates
- Acute LC_{50} estuarine and marine organisms
- Aquatic invertebrate life cycle

Nontarget Area Phytotoxicity

Tier I
- Seedling germination/seedling emergence
- Vegetation vigor
- Aquatic plant growth

Nontarget Insects
- Honeybee: toxicity of residues on foliage

7. CONTACT PERSON AT EPA

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DISCLAIMER: The information in this Pesticide Fact Sheet is a summary only and is not to be used to satisfy data requirements for pesticide registration and reregistration. The complete Registration Standard for the pesticide may be obtained from the National Technical Information Service. Contact the Product Manager listed above for further information.